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SHELLING AND PROCESSING INDUSTRY

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Agricultural Economic Report 15

U.S. DEPARTMENT OF AGRICULTURE
ECONOMIC RESEARCH SERVICE
Marketing Economics Division

PREFACE

Pecan shelling and processing on a large-scale commercial basis is relatively new. Little information has been published concerning the industry--its size, location, and marketing practices and problems. Those who produce and market pecans long have been interested in the composition of the pecan-marketing complex and in how its efficiency might be improved. This study is part of a broad program of research aimed at improving market efficiency and expanding markets for farm products, including pecans.

Dr. N. M. Penny, Head, Department of Agricultural Economics, Georgia Agricultural Experiment Station, Experiment, Ga., cooperated in planning the research, designing the questionnaires, and giving advice and counsel throughout the study. Mr. Olin W. Thompson, Gold Kist Pecan Growers, was instrumental in initiating the project. Mr. J. Givens Young, President, and Mr. Henry A. Bucklin, Secretary, National Pecan Shellers and Processors Association, provided lists of pecan shellers and helped obtain the cooperation of the industry. Mr. Hugh King, Funsten Nut Company, supplied the pictures of pecan halves and pieces. Pecan shellers and processors throughout the country gave unstintingly of their time and information concerning their business practices.

The Departments of Agricultural Economics in South Carolina, Georgia, Florida, Mississippi, Arkansas, and New Mexico cooperated in the study by conducting surveys of pecan growers in those States. The results of these studies will be combined and published in a later report.

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SUMMARY

Pecan shelling and processing firms are located throughout the southern pecan producing States and in St. Louis, Chicago, and Pittsburgh. The 80 to 90 firms in the industry assemble large quantities of pecans from wide areas of production, shell and process them, and market them through commercial and retail outlets.

The 74 firms in the survey had net sales (total sales less sales to other shellers and processors) of 164 million pounds of pecans in 1960-61. The 8 largest firms (net sales of over 5 million pounds each) accounted for 48 percent of the industry sales. The 37 largest firms (net sales over 1 million pounds) accounted for 90 percent of the industry sales.

Forty-four percent of the pecan shelling and processing firms were corporations. Of the 8 firms selling over 5 million pounds of pecans a year, 5 were corporations, 1 was a cooperative, and 2 were proprietorships. Of the 18 firms selling less than 500-000 pounds of pecans, 13 were proprietorships, 2 were partnerships, 2 corporations, and 1 was a cooperative.

During the 1960-61 season, the pecan industry operated at about 35 percent of its estimated capacity. Firms with net sales of over 5 million pounds operated on a full-time basis and attained an output rate of 60 percent of the estimated capacity. Firms selling less than 500,000 pounds of pecans tended to be part-time businesses and operated at an average rate of 10 percent of capacity.

Purchases of in-shell and shelled pecans by pecan shellers and processors totaled nearly 175 million pounds. The 8 largest firms purchased 45 percent of the total. The next 9 large firms purchased 23 percent. The 18 smallest firms purchased only 2.5 percent.

Sales of in-shell pecans to commercial outlets accounted for 6 percent of total sales of shellers and processors. Grocery wholesalers and retailers were the major outlets for in-shell pecans. Bakeries and bakery suppliers purchased 36 percent of all pecans, or 38 percent of those shelled. Confectioners used 19 percent, and the combined purchases by grocery wholesalers and retailers totaled 20 percent of all pecans marketed commercially. The use of pecans by ice cream manufacturers was 6 percent of the total, down from an estimated average of 12 percent in 1950-52. The remainder was used by salters, repackers, and mail-order gift packers.

The computation of marketing margins for shelled pecans emphasizes that the success of the individual pecan sheller may depend largely on the soundness of his buying practices. For example, a 1-cent increase in the cost of his in-shell pecans increases the pecan kernel cost to the sheller by 3 cents. Quality evaluation of the in-shell pecans is extremely important: The kernel cost to the sheller is 87.5 cents per pound for pecans which cost 30 cents per pound in-shell and yield 35 percent kernels. The kernel cost to the sheller would be only 75 cents per pound if the nuts yield 40 percent kernels.

The pecan industry needs research assistance in several important areas. On production problems, additional research is needed to find new varieties and new or improved cultural practices to stabilize, if possible, the wide variations in pecan production from year to year. On marketing problems, needed research includes studies (1) to ascertain trends of future pecan production, (2) to increase the accuracy of crop forecasts and estimates, (3) to improve the adequacy and accuracy of reported prices for pecans at the various levels in the marketing channels, (4) to determine the competitive position of pecans in commercial uses, and (5) to find new and expanded uses for pecans.

THE PECAN SHELLING AND PROCESSING INDUSTRY--PRACTICES, PROBLEMS, PROSPECTS

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INTRODUCTION

The pecan shelling industry has grown from small, largely hand-operated, side-line enterprises to large, highly automated businesses. It is a small industry, but for thousands of pecan growers throughout the South, its welfare is vitally important.

Pecans are produced commercially in 11 or more States, from North Carolina to New Mexico, and up the Mississippi River into southern Illinois and Indiana. They are produced on thousands of farms and on city lots. Some are carefully cultivated; most are not. In the Southeast, most of the pecans are improved or named varieties and are planted in groves or orchards. In the Southwest, pecans are predominantly wild or seedling trees that volunteer near sources of water. Throughout the South, pecan trees are planted around homes in urban and rural areas, providing both shade and some cash income for the owner.

The vast production area and the variety of situations under which pecans are produced make accurate forecasting of the size of the crop reaching commercial channels in any year extremely difficult. Forecasting is further complicated by the tendency of pecan trees to produce a crop of nuts every second year. The net result is that total pecan production varies widely from year to year even though large crops in one part of the production belt frequently are partially offset by small crops elsewhere. The longtime trend of production, however, is upward.

Movement of this unknown, highly-variable, and heterogenous crop of nuts to market in the form most consumers want it--shelled--is accomplished by 80 to 90 shellers scattered throughout the pecan belt, and in St. Louis, Chicago, and Pittsburgh. Some of these firms were in business when pecan shelling was largely a hand operation.

The problems of the pecan shelling industry arise from both the supply and the demand side. Shellers are faced with variable annual supplies from widely scattered areas of production. Quality of the raw product varies greatly. Shellers may purchase supplies for the entire year only during a relatively short harvest period. Finally, buying competition in the procurement of pecans sometimes results in unrealistic prices for the available but indeterminate supply of nuts to be marketed.

On the demand side, the pecan sheller faces a disadvantageous asymmetrical demand for pecans. Buyers are purchasing a luxury ingredient that has several close substitutes. Consequently, if shelled pecan prices are high relative to prices for competing nuts, pecan purchases are curtailed, as the manufacture of pecan products may be discontinued, or the amount of pecans included in the products may be reduced. This sales response is prevalent at both the commercial and household levels. But conversely, relatively low prices for shelled pecans do not result immediately in proportionately greater increases in the amount purchased.

Pecan shellers, operating under competitive conditions and with incomplete or inadequate knowledge concerning supplies and prices, often realize financial gains and many have prospered over the years.1/ Often, however, shellers are caught in the cost-price squeeze of high-cost, in-shell nut inventories and low prices for pecan kernels in the terminal markets.

This study was designed to describe and evaluate the pecan marketing system, including market organization, trade channels, buying and selling practices, and methods of establishing prices. The overall study involves research on four major components of the pecan production-marketing complex--nurseries, growers, shellers and processors, and commercial users. This report deals with the shelling and processing component of the pecan marketing system.

METHOD OF STUDY

During the spring of 1961, almost all known commercial pecan shellers and processors throughout the United States were interviewed. Concurrent with this survey, experiment stations in two States cooperated in conducting surveys of pecan growers, and stations in four additional States conducted surveys during the summer and early fall of 1961. Approximately 600 pecan growers in the six States were interviewed to get a description of their production and marketing practices. The results of the grower surveys will be covered in a later report.

THE PECAN SHELLING OPERATION

Typical Operations

Pecan shelling firms purchase in-shell pecans and market pecan kernels by sizes, grades, and qualities in various bulk and retail packages. Processing firms purchase in-shell pecans and clean, bleach, polish, and sometimes dye the nuts for sale in-shell. Most pecan shelling firms also process some nuts on request, and some of the processing firms also shell some nuts that are not suitable for sale in-shell. Less than 10 percent is sold in-shell, and most pecan processing is done by three or four specialized firms. Shelling and processing firms are combined in this study to avoid disclosing information about individual firms that specialize in processing.

Processing is a simple operation requiring a minimum of labor and equipment. Shelling is a more involved operation requiring expensive equipment and much hand labor. A brief description of the functions performed in a modern shelling plant follows.

Pecans are received at shelling plants in various containers. Buyers and dealers usually deliver nuts in 100-pound cotton or burlap bags. Small growers and local pickers bring nuts to the shelling plant in sundry containers. However, these nuts represent a small part of the total supply available to the sheller.

1/ The Market News Service reports pecan prices during the harvesting and marketing period commencing the first of November and running through December. This service has been available for several years, but shellers reported they did not use it in establishing prices.

The sheller weighs, inspects, and purchases the nuts.2/ From this point on, the sheller assumes usual market risks because of unpredictable variations in quality, losses in weight due to drying, and prices.

Pecans are stored in the bags in which they are received at the shelling plant, or, in some more modern facilities, they are cleaned, sized, and emptied into large pallet bins for storage until needed for shelling.

Cleaning consists of rotating the nuts in large cylindrical drums with slots large enough for dirt and leaves to fall through, but too small for pecans. From the rotating cylindrical drums the nuts are conveyed to blowing machines where streams of air under high pressure remove additional more-adherent dirt and debris.

From the blower or air spray machine the pecans pass through a grading or sizing machine. This is a cylindrical drum with 10 slots sized from seven-sixteenths of an inch to one inch--giving 10 different size categories. The pecans are classified into grades by these diameters. Sizing of the nuts is important because the cracking machines must be set for specific sizes. If nuts of varying sizes are run through the machine, efficiency and accuracy are greatly reduced. After the nuts are graded, they are usually sterilized to reduce the bacteria and E. Coli count usually present in newly harvested pecans.

Before the nuts are cracked, whether they are taken from the receiving platform or from temporary storage, they are soaked in vats or tanks of chlorinated water which serves the triple function of sterilizing the nuts, softening the nut shell, and making the nut kernel more pliable so that it will be less likely to break or shatter during the cracking process. There are many variations of timing, water temperature, and types of disinfectants; some plants use a live steam bath. However, the net effect is the same. The moisture content of the nuts is increased from 4.5 to about 8 percent (6).3/

After conditioning, the nuts are conveyed to hoppers which feed the cracking machines. These machines position the nuts individually, and automatic hammers strike both ends simultaneously. The cracked nuts drop to conveyor belts which transport them to the shelling machines.

Several processes are used to separate the pecan kernels from the shells. The most prevalent combines forced air and screens. An additional refinement is a flotation process. Very small pieces of kernels are removed from the shells because of the differences in specific gravity of kernels and shells.

The shelled pecans are passed over a series of shaker screens with holes of progressively larger diameter. Here the meats are separated according to size of halves and pieces. There are 8 different sizes of halves, depending on the number of halves per pound, and 8 sizes of broken or cut pecan pieces ranging from the largest, mammoth pieces, to the smallest, meal (figs. 1 and 2).

After the kernels have been segregated into the various sizes of halves and pieces they are conveyed to dryers. Moisture content of the meats is reduced from about 8 percent to approximately 4 percent. Drying machines vary in form and capacities, but most use horizontal screens through which warm air is circulated until the nut meats have reached the proper dryness.

2/ Only six shellers used Federal grades in purchasing pecans. Fourteen used private grades. The remaining firms bought on "average crop quality," "estimated yield," and "weight of bag."

3/ Underscored figures in parentheses refer to items in Literature Cited, page 27.

PECAN HALVES

Topper Halves
Above 750 Count

Medium Halves
Approx. 550-650

Large Halves
Approx. 450-550

Extra Large Halves
Approx. 350-450

Jr. Mammoth Halves
Approx. 250-300

Mammoth Halves
Approx. 200-250

Figure 1 - Some popular sizes of pecan halves (actual size)

PECAN PIECES

Medium Pieces

Large Pieces

Extra Large Pieces

Mammoth Pieces

Figure 2 - Some popular sizes of pecan pieces (actual size)

The nut meats are conveyed on moving belts from the dryers to sorting tables. Here workers sort and grade according to color and pick out defective kernels and pieces of shell missed in the previous process. Some more modern plants also have electric eye machines for additional sorting.

The shelled and graded pecans are moved on conveyors or in galvanized storage cans directly to the packaging stations. The bulk containers most widely used are corrugated cartons lined with oil-resistant paper. The net weight of nuts in these cartons ranges from 25 pounds (for mammoth halves) to 50 pounds (for granules and meal), but averages about 30 pounds. Some plants also package pecan kernels in resale packages. Cellophane bags, 4 ounces to 1 pound, and vacuum cans are popular.

Variations

There is considerable variation in size of operation, methods of preparing pecan kernels for market, and in the degree of automation of the overall process. One of the plants included in this study was a "hand" operation in which all of the cracking, shelling, sorting, and grading operations were performed by hand.

Other plants were relatively new and were highly automated. The pecans were not touched by hand during cracking, shelling, and packaging. With the exception of some fine sorting, in which only defective or offcolor nut meats were removed, all of the handling, conveying, and shelling was done automatically.

Some firms were less highly mechanized. Hand labor was used extensively in sorting and grading, although conveyors were sometimes used to move nuts from one plant process to another.

Degree of automation and investment in plant and facilities is associated with (1) the length of season the plant operates, and (2) the percentage of the firm's total income derived from the pecan enterprise. Highly automated firms usually shell pecans throughout the year. Their principal income is from sales of pecans and related products. Smaller, less highly automated firms usually are in the pecan shelling business only during the peak season in November and December. Income from pecan sales is an auxiliary or supplemental income. Other businesses engaged in by pecan shellers include seed and feed, real estate, scrap metal, candy manufacturing, and farming.

INDUSTRY LOCATION

Pecan shelling and processing plants are located throughout the pecan growing belt, and in St. Louis, Chicago, and Pittsburgh. The greatest concentrations of firms are in the areas where production is heaviest. Twenty shelling firms were interviewed in Georgia and 13 in Texas. The total number of accumulators and shellers in the various States and the number of shellers interviewed during this survey are shown in table 1.4/

NUMBER AND SIZE OF FIRMS

The 74 firms for which there were usable questionnaires, were divided into five size categories according to net volume of sales. Net volume of sales is the total in-shell and shelled sales (on an in-shell equivalent basis) less sales to other shellers and processors (table 2).

4/ Accumulators purchase in-shell nuts from smaller buyers and dealers, and sell in truckload lots to shellers and processors.

Table 1.--Number of pecan shellers and processors listed by industry and number interviewed, 1961

State	List of accumulators, shellers, and processors compiled from various industry sources	Number of shellers and processors found and interviewed
	Firms	Firms
North Carolina	8	1
South Carolina	14	4
Georgia	28	20
Florida	3	3
Alabama	18	10
Mississippi	4	3
New Mexico	2	1
Texas	26	13
Oklahoma	8	6
Louisiana	2	2
Arkansas	4	1
Tennessee	3	1
Kentucky	1	1
Missouri	3	2
Illinois	11	8
Pennsylvania	1	1
Total	136	77

Table 2.--Number of shellers and processors and net sales by size of firm, 1960-61

Code	Size of firm by net sales	Firms		Net Sales 1/	
	Million pounds	Number	Percent	1,000 pounds	Percent
Group I	5 and above	8	11	78,083	48
Group II	3 to 4.9	9	12	34,463	21
Group III	1 to 2.9	20	27	34,171	21
Group IV	.5 to .9	19	26	13,636	8
Group V	below .5	18	24	3,555	2
Total	---	74	100	163,908	100

1/ In-shell equivalent basis.

The 8 largest firms did almost 50 percent of the pecan shelling and processing business in the 1960-61 season, and 37 firms (or half of the firms surveyed) did 90 percent of the business. The 74 firms surveyed accounted for almost 164 million pounds of pecans. USDA estimated growers sold a total of 176.5 million pounds of in-shell pecans to all outlets during the 1960-61 season.

The number of firms apparently has declined in recent years, and the successful firms remaining in the industry have grown. As recently as the 1930's, the bulk of the pecan crop was sold in-shell, and the shelled pecans were shelled by hand. "Prior to

1920, few pecans were consumed commercially and those entering the edible trade were in-shell," according to Woodroff and Heaton (6). As late as 1931, Jones and Childs, in their comprehensive study made little mention of shelled pecans, and devoted only four paragraphs to the pecan shelling industry (2). They estimated that shellers handled approximately 40 million pounds of in-shell pecans or 58 percent of the total pecan crop in 1928.

The number of pecan shelling and processing firms increased gradually during the 1930's. Increased demands for shelled pecans and higher prices encouraged more firms to enter the industry. A rapid increase in the number of firms took place immediately following World War II. The number of firms operating probably reached a peak during the 1950-55 period and has gradually declined since. The decline resulted partially from the 1955 crop of pecans, which was severely underestimated and over-priced. Several firms contacted during the survey indicated they had not shelled pecans since 1956 and were now buyers only. The number of firms was further reduced by the high-priced 1960 crop, low 1961 prices for shelled pecans, and the record crop of 1961, which found many shellers with an expensive 1960 crop of pecans still on hand.

Despite the rise and fall in the number of pecan shelling firms in the industry, the proportion of the pecan crop shelled commercially has steadily increased. The largest increases have occurred since 1946. In the 1950-52 period an estimated 25 percent of the total crop was marketed in-shell, but in 1960-61 less than 10 percent of the pecans entering commercial channels was marketed in-shell. This does not include, however, pecans used on farms or sold or given away by farmers. A recent survey in South Carolina indicates a much larger production of pecans in that State than officially reported. Most of the additional pecans are produced on nonfarm lots, however, and do not move into commercial channels (5).

CHARACTERISTICS OF PECAN SHELLING AND PROCESSING FIRMS

Pecan firms vary widely in size and organization. Some of the larger firms are subsidiaries of large food corporations. Many of the smaller firms shell pecans as a supplement to other enterprises which range from real estate to scrap metal. The small firms operate only a few cracking machines and sell mostly to local accounts.

Business Organizations

About 44 percent of the pecan shelling and processing firms were corporations (table 3). Only two cooperatives were active in the pecan shelling business in 1960 (although many more cooperatives were accumulators). One of the cooperatives was in Group I (the largest firms) the other in Group V. The Group V cooperative could be classified in other size groups in other years, depending on the size of the pecan crop in its area.

Partnerships were the leading type of business organization for firms in Group III, accounting for 45 percent of the total for the group. Over half of the partnerships in the industry were in Group III.

About 30 percent of the firms interviewed were proprietorships, but most of these were Group V firms, or those selling less than 500,000 pounds of pecans in 1960-61. In general these firms tend to part-time businesses.

Table 3.--Number of pecan shellers and processors, by ownership characteristics and size of firm, 1960-61

Business organization	Firm size group					
	I	II	III	IV	V	Total
	Firms	Firms	Firms	Firms	Firms	Firms
Proprietorship.....	-	2	4	4	13	23
Partnership.....	2	1	9	3	2	17
Cooperative.....	1	-	-	-	1	2
Corporation.....	5	6	7	12	2	32
Percent of firms	Percent	Percent	Percent	Percent	Percent	Percent
Proprietorship.....	--	22	20	21	72	30
Partnership.....	25	11	45	16	11	23
Cooperative.....	12	--	--	--	6	3
Corporation.....	63	67	35	63	11	44

Age of Firms

The average age of all firms was 23 years. Firms in Group I averaged 22 years of age (table 4). Firms in Group V averaged 21 years of age. Although firms in Group I ranged from 5 to 68 years of age, firms that reported being in business only 5 and 6 years were actually reflecting recent acquisitions of firms that had been in business much longer.

Table 4.--Age of pecan shelling and processing firms, by size, 1960-61

Item	Group I	Group II	Group III	Group IV	Group V
	Years	Years	Years	Years	Years
Average..	22.1	25.1	27.9	20.1	21.2
Range....	5-68	11-50	4-72	3-55	5-40

Facilities and Their Use

Size of plants is often measured by the number of cracking machines the plant has available. The capacity of the cracking machines varies with the types and sizes of nuts cracked. Estimates ranged from 62 to 90 pecans a minute. Other estimates, on a per pound basis, averaged 50 pounds of pecans per machine hour. The number of crackers available in the five size groups, the amount of in-shell nuts cracked in 1960-61, and the potential capacity are shown in table 5.

The average number of crackers in the five size groups masks the wide variations in plant facilities available. Some plants in Group II and Group III had more cracking machines than plants in Group I. One firm in Group III had more cracking machines than any of the other firms except for two of the largest in Group I. Thus, the wide variations in physical facilities indicate that, according to the size categories used in this report, the numbers of firms in the three top categories might change slightly from year to year. The rate of use of facilities and size of firm is limited by the

Table 5.--Number of crackers, computed capacity, and actual output of pecan shellers, by size of firm, 1960-61

Size of firm	Crackers		Computed capacity 1/	Actual output	
	Total	Per firm		Total	As percentage of capacity
	Number	Number	1,000 pounds	1,000 pounds	Percent
Group I.....	727	91	116,320	69,608	60
Group II.....	508	56	81,280	33,217	41
Group III....	742	37	119,040	30,469	26
Group IV.....	411	22	70,080	11,248	16
Group V.....	197	11	34,720	3,423	10
Total....	2,585	--	421,440	147,965	35

1/ Computed at rate of 50 pounds of in-shell pecans per hour, 80 hours per week (two 8-hour shifts per day--40 weeks per year).

amount of capital available to the management for procurement of in-shell nuts. In years of high in-shell nut prices, firms may buy only enough to fulfill commitments to regular customers. In years of low prices, they may purchase in-shell nuts to the limit of their finances in the hope of competing for additional outlets or holding the nuts in cold storage until the next year when prices might be higher.

In 1960, 187.5 million pounds of pecans were produced. This was a large crop. Prices were high, however, because of a small carry-over from the 1959 crop, estimated at only 145 million pounds. High prices for in-shell pecans and the drop in prices for shelled pecans in the terminal markets caused the industry to operate at only about 35 percent of capacity in 1960-61. Firms in Group I operated cracking machines on a full-time basis, and, as a group, averaged 60 percent of the estimated capacity limits. One firm in Group I operated at a rate of 111 percent of estimated capacity.

Firms in Group V shelled pecans as a sideline business. This group shelled only 10 percent of the volume of pecans for which the firms had shelling capacity, and none of the firms operated at more than 35 percent of capacity.

Number of Employees

The pecan shelling industry provides employment for many people throughout the South. Most of these people, however, are employed on a seasonal basis. The total number of regular employees in the 74 firms was 1,210, ranging from an average of 1 per Group V firm to 102 for firms in Group I. There were 3,167 seasonal employees, ranging from an average of 10 per Group V firm to 150 for firms in Group I. Numbers of employees for firms in the various size categories are shown in table 6.

The length of time seasonal employees worked varied widely in all groups and ranged from 2 to 11 months. Some firms reported no seasonal employees but kept the same force employed 12 months a year. While the data do not lend themselves to exact calculations of labor requirements to produce a pound of pecan kernels, these requirements can be approximated.

Table 6.--Annual and seasonal employment by pecan shellers and processors, by size of firm, 1960-61

Size of firm	Annual		Seasonal	
	Total	Average	Total	Average
	Employees	Employees	Employees	Employees
Group I.....	812	102	1,203	150
Group II.....	189	21	768	85
Group III.....	106	5	722	36
Group IV.....	86	4	298	16
Group V.....	17	1	176	10
Total.....	1,210	16	3,167	43

Labor Requirements

The three largest size groups of firms showed little difference in output of pecan kernels per man-hour of labor (table 7). Groups I and III averaged 11.9 pounds of kernels per man-hour, and those in Group II averaged slightly less--10.7 pounds per man-hour. Firms in Group IV averaged 8.5 pounds of kernels per man-hour and those in Group V averaged 6.6 pounds.

Table 7.--Pecans shelled and labor used by pecan shellers, by size of firm, 1960-61

Size of firm	Pecans shelled per season		Labor	Pecans shelled per man-hour	
	In-shell weight	Kernels		In-shell weight	Kernels
	1,000 pounds	1,000 pounds	Man-hours	Pounds	Pounds
Group I.....	9,745	3,703	311,349	31.3	11.9
Group II....	4,337	1,375	128,629	33.7	10.7
Group III...	1,700	562	47,312	35.9	11.9
Group IV....	887	226	26,612	33.3	8.5
Group V.....	241	65	9,824	24.5	6.6

The indicated labor requirements for obtaining a pound of pecan kernels are not precisely comparable. The range in size of firms in Group I is much greater than the ranges in size of all other groups combined. It would be difficult to ascertain the economies of scale in pecan shelling without further study. It appears, however, that the size and growth of firms has been associated more closely with procurement and selling practices than with high efficiency in the shelling operation.

Labor requirements also may be influenced by the types of market outlets firms have for their pecans and the percentages of their output that are sold bulk or in resale packages. All firms sold over 80 percent of their pecan kernels in bulk containers. Firms in Group II sold over 90 percent of their pecans in bulk packages. Averages by size groups mask variations in labor requirements due to variations in types of outlets.

PRACTICES

Financial and storage practices of pecan shelling and processing firms also vary widely. Large firms are well financed and are able to purchase and store large inventories of in-shell pecans. These may be carried from one year to the next. Smaller, seasonal firms usually lack capital and must sell their shelled pecans during the peak holiday season.

Financing Inventories

To finance the inventories that must be purchased in the fall, shellers used their own funds, or bank financing based on warehouse receipts, open notes, chattel mortgages, receivables, and real estate mortgages (table 8). Most shellers preferred open notes and were successful in obtaining them. Often the shelling plant is a leading industry in a town, and the firm has established credit with its bank. The least desirable methods of obtaining funds were through chattel mortgages, receivables, and real estate mortgages. Shellers said that they resorted to these methods of obtaining operating capital only when other methods failed.

Table 8.--Number of pecan shellers and processors using specified methods of financing inventories, by size of firm, 1960-61 1/

Methods of financing inventories	Size of firm					
	Group I	Group II	Group III	Group IV	Group V	Total
	Firms	Firms	Firms	Firms	Firms	Firms
Own funds	3	5	4	3	6	21
Warehouse receipts	2	3	9	5	3	22
Open note	4	4	14	7	9	38
Other 2/	2	-	3	3	2	10
Total	11	12	30	18	20	91

1/ Figures do not total to number of firms because some firms use more than one method of financing inventories.
2/ Includes chattel mortgages, receivables, and real estate mortgages.

Storage

Pecans can be stored either shelled or in-shell for long periods of time under refrigeration, and indefinitely when frozen. Shellers keep their supplies of in-shell nuts in unrefrigerated storage during the winter months. As temperatures become warmer, in-shell inventories are moved into refrigerated storage. Practically all of the shelled pecans are placed in cold storage immediately after shelling, but some for immediate delivery are left unrefrigerated during the winter months.

Despite the adaptability of pecans to storage, few firms own their own storages. Firms reported owning refrigerated storage capacity for 29 million pounds of shelled pecans (table 9). Firms in Group I accounting for 48 percent of total sales owned almost 58 percent of the storage space in the pecan industry. Firms in Group II had 10 percent of the storage space but represented 21 percent of net sales. Group III firms owned 17 percent of the storage space and accounted for 21 percent of the net sales. Thus, the amount of storage space owned by the groups of firms is roughly

Table 9.--Refrigerated storage space owned by pecan shellers and processors and number of firms using this storage for specified periods, by size of firm, 1960-61

Size of firm	Storage capacity, shelled nuts	Usual length of storage 1/			
		Shelled		In-Shell	
		Less than 6 months	More than 6 months	Less than 6 months	More than 6 months
	1,000 pounds	Firms	Firms	Firms	Firms
Group I.....	16,735	1	7	1	7
Group II.....	2,900	4	5	6	3
Group III....	5,065	3	15	7	11
Group IV.....	3,885	7	7	4	9
Group V.....	415	5	7	5	4
Total....	29,000	20	41	23	34

1/ Storage time depends on supplies and market situations. In years of short crops and high prices, pecans are stored a very short time. In years of large crops and low prices pecans may be carried from one year to the next.

proportional to the volume of sales for the group. However, most of the storage space is owned by a few firms in each group. All firms rented refrigerated storage space, either locally or in major cities, whether they owned storage space or not.

Whether it is less expensive to own or rent storage space is debatable. The competitive position of firms in obtaining and carrying quantities of nuts, however, obviously is enhanced by the availability of adequate refrigerated storage.

The amount of pecans carried in storage from one year to the next is important to the industry. In 1948, the Deciduous Fruit and Tree Nut Advisory Committee recommended that the U.S. Department of Agriculture conduct surveys each year as of June 30 to determine the amounts and kinds of tree nuts stored both shelled and in-shell. These surveys included pecans from 1948 until 1953, when they were discontinued due to lack of support from the pecan industry. The surveys continue to determine the amounts of almonds, filberts, and walnuts in commercial storage.

The carryover of pecans from one year to the next offers the most immediate possibility for stabilizing pecan prices and effecting the orderly marketing of pecans. Additional information is needed concerning the annual carryover of pecan stocks, both in commercial and in privately owned storages. The amount of old-crop pecans in storage often may affect prices for new-crop pecans as much as the fall crop forecasts.

PROCUREMENT

Procurement of in-shell pecans is a major problem of pecan shellers and processors. In the early days, shellers, with few exceptions, were content to purchase and shell or process pecans produced and brought in to them by local growers and dealers in their immediate area. Increased mechanization of the shelling process resulted in increased speed and efficiency, and now shellers cover wider areas to procure sufficient quantities of nuts. "We now shell more pecans in a day than we shelled during the first year of our operation in 1937. During this first year's operation, we had one full-time employee and paid the women workers on a per pound, piece-work basis. What a difference now!" (3)

To obtain the larger supplies of nuts needed for a continuous, economic shelling operation, larger shellers have found it necessary to establish sizable and often far-flung purchasing operations. These usually take the form of informal arrangements with local buyers in various locations throughout the pecan belt. There are also large accumulators of in-shell pecans, who, through years of experience in the pecan industry and wide knowledge of production areas and local buyers, are able to obtain large supplies of pecans. These accumulators are criticized by pecan shellers for adding to the cost of in-shell nuts, but they are, nevertheless, the principal source of supply for many of the larger shellers (table 10). Accumulators are particularly successful in the western regions where the pecans grow wild and are harvested largely by "pickers" who sell to the nearest local dealer. The pecans may be sold to several successively larger local dealers before reaching the accumulator.

Table 10.--Number of pecan shellers and processors preferring specified sources for buying in-shell pecans, by size of firm, 1960-61

Size of firm	Growers	Local dealers	Accumulators	No preference	Other 1/	Total
	Firms	Firms	Firms	Firms	Firms	Firms
Group I.....	1	1	5	-	1	8
Group II.....	2	2	4	1	-	9
Group III....	1	5	11	3	-	20
Group IV.....	4	5	7	1	2	19
Group V.....	6	-	6	4	2	18
Total....	14	13	33	9	5	74

1/ Includes truckers, brokers, and own production.

Purchases of in-shell pecans have been grouped by size of firm (table 11). Firms in Group I purchased almost 78 million pounds or 45 percent of the total pecans purchased by shellers. Nine firms in Group II purchased 39 million pounds, and 20 firms in Group III purchased 34 million pounds of pecans. The 74 firms purchased slightly over 172 million pounds of pecans from the 1960 crop.

Table 11.--Purchases of in-shell and shelled pecans by pecan shellers and processors, by size of firm, 1960-61

Size of firm	In-shell purchases and own production		Shelled purchases (In-shell equivalent)		Total purchases and own production	
	1,000 pounds	Percent	1,000 pounds	Percent	1,000 pounds	Percent
Group I.....	77,958	45.3	458	17.8	78,416	44.9
Group II.....	39,031	22.7	828	32.2	39,859	22.8
Group III....	34,005	19.7	1,062	41.3	35,067	20.1
Group IV.....	16,862	9.8	151	5.9	17,013	9.7
Group V.....	4,346	2.5	70	2.7	4,416	2.5
Total...	172,202	100.0	2,569	100.0	174,771	100.0

Shellers and processors reported purchasing nearly 118 million pounds of seedling pecans and 54 million pounds of improved varieties. These data compare with the official USDA estimate of nearly 102 million pounds of seedlings and 75 million pounds of improved pecans sold to all outlets by farmers. The data on purchases in this report may be slightly high due to some unreported double counting of purchases (as when one sheller purchased in-shell pecans from another.)

Crop Estimates

One of the major problems in marketing pecans is estimating each year the total volume of pecans to be marketed. The Crop Reporting Board of the U.S. Department of Agriculture releases forecasts beginning in August of the size of the forthcoming crop. Subsequent forecasts are made in September, October, and November, and a final forecast is made in December. Information for the forecasts is obtained from farmers and ranchers who return questionnaires concerning the condition of the pecan crop in their areas. In December, the producers are requested to estimate the number of pounds of pecans they expect to harvest in comparison with the quantity harvested the previous year. The final estimate of the crop is made the following July and is obtained from reports of shellers, processors, and accumulators concerning the volume of pecans handled.

Forecasting the size of the pecan crop is difficult. Since accurate counts of tree numbers or acres are not available, the estimates depend to a large extent on the cooperation of producers and marketers in sending accurate reports. Despite these difficulties, the forecasts are surprisingly accurate. Shellers, who remember most vividly the occasional years when the forecasts missed the final outturn substantially, expressed concern over these "misses" and believe that the forecasts work to their disadvantage on prices.

There are some indications, however, that the USDA estimates are consistently lower than actual production. Chappell, in an analysis of crop estimates and final production for the years 1937-57, found that "The monthly forecasts show a clear tendency to underestimate final production."5/ In addition, this analysis of official data overlooks the fact that pecans produced in Kentucky, Tennessee, Missouri, Illinois, and Indiana are not included in the USDA crop estimates.

It is possible that the industry has marketed a crop of over 200 million pounds of pecans in other years, but the official estimate has been larger than that only twice--in 1953 and 1961. While an official forecast of a 200-million-pound crop causes some concern within the industry regarding market outlets and prices, pecan shellers assert that a larger crop, consistently produced, could be efficiently marketed. It was indicated earlier in this report that the industry has shelling capacity for a crop larger than 200 million pounds.

Varieties

Shellers in Group I purchased nearly half of all the seedling pecans and "blends," (table 12) 6/. They also purchased approximately 70 percent of the Schleys, a premium variety with a high percentage crackout and high oil content. Large shellers purchased about 25 percent of the Stuarts, the leading named variety grown in the Southeast.

5/ Chappell, Joe Senter. An Analysis of Some Economic Factors Affecting the Marketing of Oklahoma Pecans. Unpublished masters thesis, Oklahoma State University, May 1959.

6/ It is the custom in the pecan shelling industry to have four categories of pecans: Seedlings, Stuarts, Schleys, and Blends. Blends include all other improved varieties.

A high proportion of Stuart pecans was purchased by shellers in Group V because they tend to specialize in gift packages and mail order businesses. The Stuart pecan halves are especially suited for attractive packages of pecan meats.

Table 12.--Purchases of in-shell pecans by pecan shellers and processors, by varieties and size of firm, 1960-61

Size of firm	Stuarts	Schley	Blends	Seedling	Total
	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
Group I.....	5,875	5,845	10,483	55,754	77,957
Group II.....	6,256	533	3,568	28,675	39,032
Group III....	4,697	613	5,481	23,214	34,005
Group IV.....	3,537	539	4,290	8,496	16,862
Group V.....	1,851	290	470	1,735	4,346
Total....	22,216	7,820	24,292	117,874	172,202

Sources

Most shellers in the three large-size categories depended on accumulators for the bulk of their pecan supplies. Over 50 percent of the pecans purchased by shellers in Group I came from accumulators (table 13). A much higher percentage would have been reported from this source except for the inclusion of cooperatives and large grower-shellers in Group I. These firms listed their sources of supply as "growers at plant or buying station," "grower at farm," and "other." Most shellers reported they prefer to buy from growers, but had to buy from accumulators to obtain large quantities of the same variety of nuts.

Table 13.--Purchases of in-shell pecans from various sources by pecan shellers and processors, by size of firm, 1960-61

Size of firm	Growers at plant or buying station	Grower at farm	Local buyers	Accumulators	Other 1/	All sources
	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
Group I...	13,512	1,346	14,450	40,900	7,750	77,958
Group II..	7,620	174	11,020	20,142	75	39,031
Group III.	4,167	603	6,644	20,655	1,935	34,004
Group IV..	4,317	129	5,552	4,245	2,620	16,863
Group V...	1,516	187	482	1,139	1,021	4,345
Total.	31,132	2,439	38,148	87,081	13,401	172,201

1/ Includes "own production," "truckers," "auction," and "brokers."

Firms in Group II and III obtained the bulk of their pecans from accumulators. "Growers at the plant" and "local buyers" were the principal suppliers of pecans to shellers in Group IV. Firms in Groups IV and V also purchased approximately 25 percent of their total supplies from accumulators.

Regions

The 41 shellers in the Southeast purchased almost 64 million pounds of pecans (table 14). The 23 shellers interviewed in the Southwest bought or produced 68 million pounds. Shellers in the Central area purchased almost 40 million pounds of pecans.

Table 14.--Number of pecan shellers and processors and purchases of in-shell pecans, by regions, 1960-61 1/

Region	Firms	Purchases and own production		
		Improved varieties	Seedlings	Total
	Number	1,000 pounds	1,000 pounds	1,000 pounds
Southeast 2/	41	32,802	31,132	63,934
Southwest 3/	23	14,170	54,197	68,367
Central 4/	13	7,356	32,545	39,901
Total	77	54,328	117,874	172,202

1/ Pecan shelling and processing plants grouped by regions to avoid disclosing the identity of individual firms.
2/ Includes North Carolina (1), South Carolina (4), Georgia (20), Florida (3), Alabama (10), and Mississippi (3).
3/ Includes Louisiana (2), Arkansas (1), Texas (13), Oklahoma (6), and New Mexico (1).
4/ Includes Missouri (2), Illinois (8), Tennessee (1), Kentucky (1), and Pennsylvania (1).

More shellers are located in the Southeast than in the other areas, but the average size is smaller. The 41 shellers in the Southeast purchased an average of 1.6 million pounds of pecans compared with an average of 3.0 million pounds for shellers in the Southwest and 3.1 million pounds by shellers in the Central Region.

Most of the improved pecans are grown in the Southeast, and shellers in the area purchased 33 million of the 54-million-pound total. Southwestern shellers used 14 million pounds of improved pecans; over half came from the shellers' own production. The bulk of the 7 million pounds of improved varieties purchased by shellers in the Central Region was processed for the in-shell trade.

The dissimilarities of the Southeastern and Southwestern production areas are indicated by the sources of supplies for shellers and processors (table 15). Accumulators are the principal source of supply in all areas, but are less important in the Southeast than in other areas. Shellers in the Southeast reported that they purchased almost 23 million pounds of pecans from growers at the plant or buying stations. In the Southeastern States, the bulk of the pecans are grown as a commercial crop by growers who are members of marketing organizations or have enough supplies to sell in

quantity directly to shellers. In the Southwest, pecans are obtained from seedling trees and often are marketed in small lots to the nearest local dealer. It follows that shellers in the Central area buy relatively few pecans from growers because they are not located as near the major commercial producing areas.

Table 15.--Purchases of in-shell pecans from various sources by pecan shellers and processors, by regions, 1960-61

Region	Growers at plant or buying station	Growers at farm	Local buyers	Accumulators	Other 1/	All sources
	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
Southeast..	22,901	2,389	12,668	24,886	1,090	63,934
Southwest..	6,863	50	25,480	27,717	8,256	68,366
Central....	1,367	--	--	34,479	4,055	39,901
Total..	31,131	2,439	38,148	87,082	13,401	172,201

1/ Includes truckers, auctions, other shellers, brokers, and own production.

Use of Grades

Only six shellers reported using Federal grades in purchasing in-shell pecans (table 16). Fourteen additional shellers used private grades which included an evaluation of the kernel yield of the nuts. The remaining shellers bought pecans by "average crop quality," "visual inspection," "dealer's reputation," "by area," and "weight of the bag." Some shellers reported they did not see the pecans until they were being shelled.

Table 16.--Number of pecan shellers and processors using Federal or other grades in buying in-shell pecans, by size of firm, 1960-61

Grade	Size of firm					
	Group I	Group II	Group III	Group IV	Group V	Total
	Firms	Firms	Firms	Firms	Firms	Firms
Federal.....	-	-	2	1	3	6
Private.....	2	3	2	4	3	14
Average crop quality.	-	1	2	2	1	6
None 1/.....	6	5	14	12	11	48
Total.....	8	9	20	19	18	74

1/ Those who reported "none" bought by "personal inspection," "yield," "personal judgment," and "weight of bag."

Much the same situation exists in selling pecan kernels. Most shellers sell pecan halves according to the number of halves per pound, and these are graded according to

"fancy," "standard," or "ambers." A few shellers reported using the middle grade, "standard." However, considerable variation occurs in the names used by shellers to indicate the various sizes of halves and pieces.

Most shellers indicated that the U.S. grades for in-shell pecans are suitable for sales of in-shell pecans, but are not a basis for buying shelling stock. Shelling stock must be evaluated on the basis of yield of kernel. Some shellers indicated their customers for shelled pecans demanded much higher quality kernels than specified in the United States Standards for Shelled Pecans. The Standards allow broad color variations and 0.2 percent shell tolerance. Some shellers believe U.S. No. 1 pecans should be labeled "Free of Shell."

United States Standards for grades of shelled and in-shell pecans are available for the use of the pecan industry on a voluntary inspection basis. It is the responsibility of the industry to initiate procedures to change the standards to satisfy current industry needs.

Shelled Pecans

There is little traffic in shelled pecans among shellers. Only 877,860 pounds of pecan meats were exchanged during the 1960-61 season. Most of these transactions were trades rather than sales or purchases. Converted to an in-shell-equivalent basis, the total quantity involved was $2\frac{1}{2}$ million pounds, or only about 1 percent of the total quantity of pecans in commercial channels.

SALES

For the individual sheller, sales outlets for shelled pecans are highly variable. Shellers must purchase all of their in-shell supplies during the short harvest period in November and December, and compete for market outlets for pecan meats during the remaining months of the year. The financial burden of the in-shell inventory and the need for working capital leads to sharp price competition among shellers for outlets for the shelled pecans. Buyers of pecan meats, on the other hand, are aware of this intense competition and are quick to shift among suppliers to obtain pecans at lower prices.

For this reason, pecan shellers are confronted each year with an uncertain market. For any individual sheller, the percentage of his shelled pecans that goes to each of the various outlets may vary widely. One year, the bulk of his pecan volume might be sold to a large confectioner; the next year, perhaps large bakeries are his major customers. Smaller shellers are concerned less with this problem because their primary outlets are local bakeries, candy manufacturers, mail-order gifts, and church or service organization fund-raising sales. Thus, sales patterns within the industry vary from year to year, but the overall pattern of sales for the entire industry is relatively stable. An increasing portion of the total pecan crop is shelled, and proportions of the total pecan meats used by various outlets are rather fixed.

The data in this section are based on sales of the 1960 crop, plus carryover from the 1959 crop. When shellers were not certain about quantities sold to outlets they were asked to estimate percentages of sales to various major outlets. These percentages were applied to the amount of pecan meats available for sale (fig. 3). The 1960-61 crop was large and high-priced. Hence, 1960-61 sales data might not be representative of sales in other years.

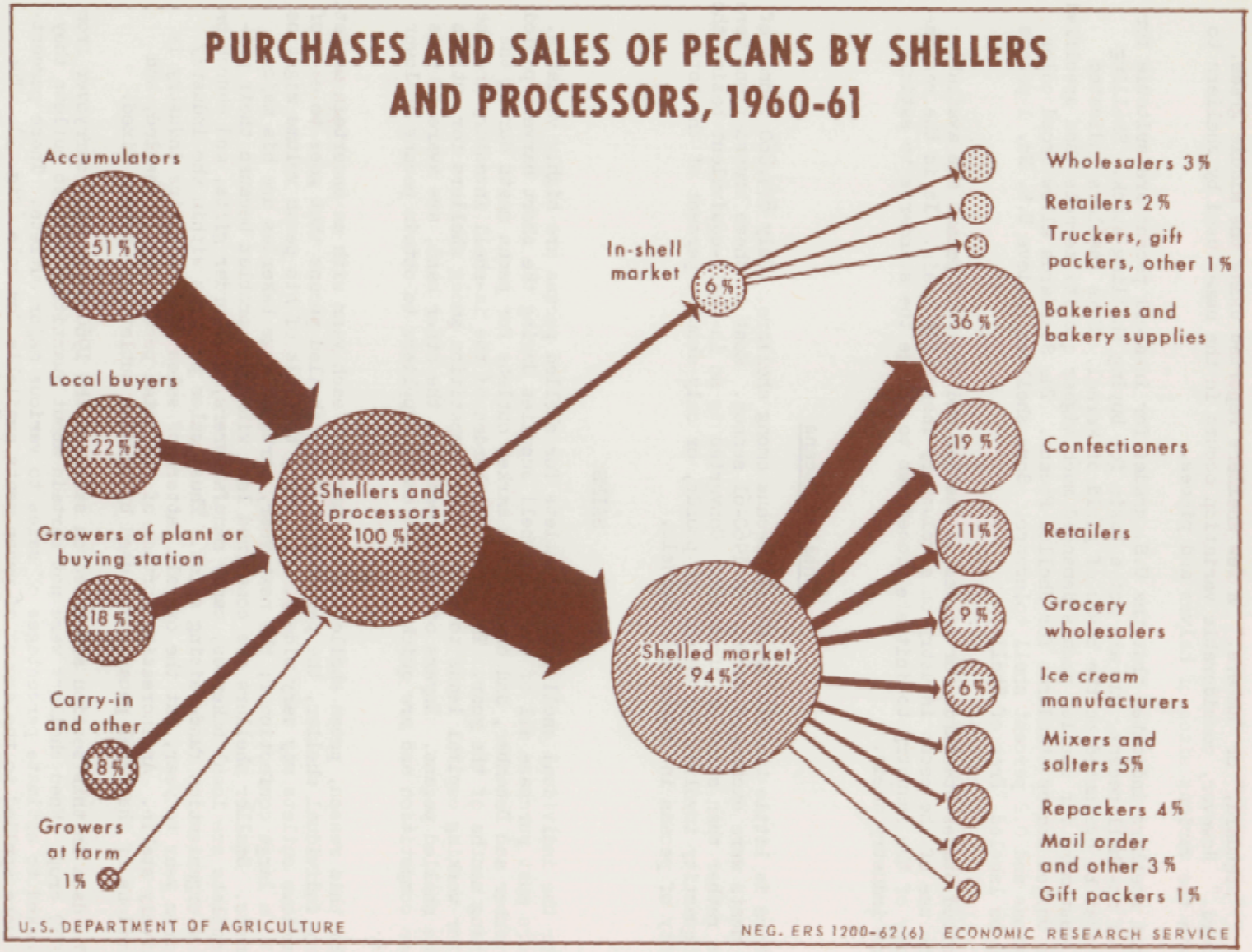
PURCHASES AND SALES OF PECANS BY SHELLERS AND PROCESSORS, 1960-61
Accumulators
51%
Local buyers
22%
Growers of plant or buying station
18%
Carry-in and other
8%
Growers at farm
1%
Shellers and processors
100%
In-shell market
6%
Shelled market
94%
Wholesalers 3%
Retailers 2%
Truckers, gift packers, other 1%
36%
Bakeries and bakery supplies
19%
Confectioners
11%
Retailers
9%
Grocery wholesalers
6%
Ice cream manufacturers
Mixers and salters 5%
Repackers 4%
Mail order and other 3%
Gift packers 1%
U.S. DEPARTMENT OF AGRICULTURE
NEG. ERS 1200-62(6) ECONOMIC RESEARCH SERVICE

Figure 3

Outlets for Shelled Pecans

Bakeries and bakery suppliers are the principal outlets for shelled pecans, using approximately 38 percent of the total (table 17). Confectioners buy approximately 20 percent of all the pecans shelled, while retail grocers buy 11 percent and wholesale grocers take 9 percent.

Table 17.--Percentage of shelled pecans sold to various outlets by shellers, 1950-52 and 1960-61

Outlet	Sales for 1960-61	Estimated sales for 1950-52 average
	Percent	Percent
Bakeries	38	44
Confectioners	20	20
Mixers and salters	6	7
Wholesale grocers	9	12
Retail grocers	11	--
Ice Cream manufacturers	7	12
Gift packers	1	--
Repackers	4	--
Other	4	5
Total sales	100	100

Sales to households (through grocery outlets) were greater than the estimated averages for 1950-52, probably reflecting the improvements in packaging methods and materials that have been made during the past 10 years (4). Sales to ice cream manufacturers were about half the estimated average sales for 1950-52. Unstable supplies and unpredictable prices may have led to the curtailed use of pecans in ice cream products. The volume of ice cream produced increased during this period. Approximately 65 percent of the shelled pecans sold to retailers came from firms in Group I (table 18). This agrees with a similar trend for fruits and vegetables. Chainstores generally prefer to buy directly from shippers who can supply large quantities of a uniform-quality product.

Outlets for In-shell Pecans

The principal customers for in-shell pecans from shellers and processors were other shellers and processors (table 19). They bought almost 54 percent of those sold. The other major outlets were grocery wholesalers (25.3 percent) and retailers (15.6 percent). Large pecan-shelling firms made few sales of in-shell pecans in 1960-61. Only three of the eight firms in Group I handled any in-shell sales. Most of the in-shell nut sales were by accumulators who also had shelling or processing operations, or by processors who were usually subsidiaries of in-shell nut mixers and wholesale grocers. The sheller-accumulators sold their in-shell nuts to other shellers and processors; the processors sold their pecans to retail and wholesale outlets.

Table 18.--Shelled pecans sold by pecan shellers to various outlets, by size of firm, 1960-61

Outlet	Size of firm					
	Group I	Group II	Group III	Group IV	Group V	Total
	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
Grocery wholesalers	1,744	933	2,019	353	152	5,201
Retailers	4,314	1,177	688	338	124	6,641
Mixers and salters	1,244	1,413	517	54	78	3,306
Confectioners	6,269	2,180	2,247	947	148	11,791
Bakeries and bakery supplies	12,368	4,394	3,932	1,570	270	22,534
Ice Cream manufacturers	2,163	606	890	236	--	3,895
Gift packers	142	126	285	161	52	766
Repackers	1,226	389	351	467	172	2,605
Mail order and other	151	1,153	317	172	182	1,975
Total	29,621	12,371	11,246	4,298	1,178	58,714

Table 19.--In-shell pecans sold by pecan shellers and processors to various outlets, by size of firm, 1960-61

Outlet	Size of firm					
	Group I	Group II	Group III	Group IV	Group V	Total
	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
Truckers	--	--	--	--	46	46
Wholesalers	1,058	604	2,298	902	243	5,105
Retailers	250	612	1,354	931	--	3,147
Gift packers	--	17	25	5	--	47
Shellers, dealers and processors	333	5,396	897	3,377	861	10,864
Other	167	13	25	550	192	947
Total	1,808	6,642	4,599	5,765	1,342	20,156

Sales Practices

One large firm maintains sales organizations in the larger cities throughout the country. All other large firms in the industry have arrangements with brokers in key distribution points. Smaller firms also use brokers but to a lesser extent.

Nearly 60 percent of all net sales was made through brokers (table 20). Shellers ship their pecans in large lots to cold storage facilities in a major market area.

The broker sells the pecans and has them delivered from storage. The sheller pays the cold storage charges and a fee of about 2 percent of the sales price to the broker.

Table 20.--Total and net sales by pecan shellers and processors, in-shell equivalent basis, 1960-61 1/

Size of firm	Total sales	Sales to other shellers and processors	Net sales		
			Through brokers	Direct	Total
	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
Group I.....	78,416	333	48,599	29,484	78,083
Group II.....	39,859	5,396	21,074	13,389	34,463
Group III....	35,068	897	19,848	14,323	34,171
Group IV.....	17,013	3,377	7,047	6,589	13,636
Group V.....	4,415	860	1,472	2,083	3,555
Total....	174,771	10,863	98,040	65,868	163,908

1/ Net sales are total sales less sales to other shellers and processors.

Most of the direct sales of pecans by shellers and processors were made under contracts with large users. Contracts are made during the harvest season and usually specify the total, or a schedule of quantities, of pecan kernels to be delivered throughout the remainder of the spring and summer. The contract price is usually the market price at the time of the contract. After March 1, a storage charge of 0.5 cent per pound per month is added to the contract price.

Contracts seem to be rather weak instruments for shellers. Almost all contracts contain a price-decline clause, which guarantees against a decline of their own prices or the prices of one or more of the larger shellers. Such contracts are easily broken by the purchaser. He can reject shipments of nuts, and may resort to this procedure if the contract price is higher than the current market price. At this point, however, shellers usually adjust their prices to current market prices, particularly if the purchaser is a large buyer. On the other hand, contract prices are never adjusted upward if the current market price is higher than the contract price. The extent to which shellers failed to make delivery when current market prices rose above contract prices was not determined.

Sales by Areas

Sales of both in-shell and shelled pecans follow patterns based on the types of nuts produced in the Southeast and Southwest (table 21). For example, shellers in the Southeast predominate in sales of nut meats to retailers, mixers and salters, and mail-order outlets. Pecan kernels from the improved varieties produced principally in the Southeast are especially attractive and are preferred in resale items. Shellers in the Southwest led in sales of pecans to confectioners and bakeries, where the small, flavorful, but hard to shell, seedling pecan is widely used as an ingredient in candy and baked goods. Shellers in the Central area have equal access to pecans from the two major production areas and their sales outlets were less specialized. A higher proportion of kernels sold by Central shellers, approximately 20 percent, was in consumer packages.

Table 21.--Sales of shelled pecans by pecan shellers to various outlets, and in bulk and consumer packs, by regions, 1960-61

Outlet and pack	Southeast	Southwest	Central	Total
	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
Outlet:				
Grocery wholesalers	1,258	2,258	1,684	5,200
Retailers	2,709	2,131	1,802	6,642
Mixers and salters	1,683	595	1,028	3,306
Confectioners	3,592	5,856	2,344	11,792
Bakeries and bakery suppliers	6,906	9,547	6,082	22,535
Ice cream manufacturers	1,131	1,430	1,334	3,895
Gift packers	726	41	--	767
Repackers	956	1,256	392	2,604
Mail order and other	1,424	399	151	1,974
Total	20,385	23,513	14,817	58,715
Kind of pack:				
Bulk pack	18,893	19,910	12,404	51,207
Consumer pack	1,492	3,603	2,413	7,508

Nearly all of the in-shell pecans bought by wholesalers and retailers came from Southeastern shellers, further indicating the preference for improved varieties in direct-to-consumer outlets (table 22).

Table 22.--Sales of in-shell pecans by pecan shellers and processors to various outlets, by regions, 1960-61

Outlet	Southeast	Southwest	Central	Total
	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
Truckers	46	--	-	46
Wholesalers	4,517	335	253	5,106
Retailers	2,760	137	250	3,147
Gift packers	42	5	-	47
Shellers, dealers and processors	3,444	7,370	50	10,863
Other 1/	773	167	7	947
Total	11,582	8,014	560	20,156

1/ Includes retail sales at own retail outlets and sales to nurseries.

MARGINS

Examples of marketing costs for pecans are shown using a series of possible grower prices for in-shell pecans of assumed qualities (table 23). The shelling and marketing

Table 23.--Schedules of shellers' break-even wholesale price per pound (shelled basis) in New York City for Georgia Stuart and Texas seedling pecans at various shellout percentages and growers' in-shell prices

Cost item (shelled basis)	Georgia Stuart pecans						Texas seedling pecans					
	40-percent shellout			45-percent shellout			30-percent shellout			35-percent shellout		
	25 cents	30 cents	35 cents	30 cents	35 cents	40 cents	20 cents	25 cents	30 cents	25 cents	30 cents	35 cents
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
Growers' price	62.5	75.0	87.5	66.7	77.8	88.9	66.7	83.3	100.0	71.4	85.7	99.0
Accumulators' average margin 1/	8.5	8.5	8.5	7.5	7.5	7.5	6.3	6.3	6.3	5.4	5.4	5.4
Shellers' kernel cost	71.0	83.5	96.0	74.2	85.3	96.4	73.0	89.6	106.3	76.8	91.1	104.4
Shelling and overhead cost (average)	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
Storage, interest, handling (average)	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Shellers' cost at loading dock	91.4	103.9	116.4	94.6	105.7	116.8	93.4	110.0	126.7	97.2	111.5	124.8
Transportation to New York (estimated)	3.0	3.0	3.0	3.0	3.0	3.0	6.0	6.0	6.0	6.0	6.0	6.0
Brokerage and selling cost (1960-61 average) 2/	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Shellers' break-even selling price in New York City	96.9	109.4	121.9	100.1	111.2	122.3	101.9	118.5	135.2	105.7	120.0	133.3

1/ Average difference between grower and accumulator in-shell prices was 3.4 cents in Georgia and 1.9 cents in Texas.

2/ The brokerage charge is 2 percent of the selling price and varies accordingly. In 1960-61, the brokerage charge averaged 2.5 cents.

costs are averages of those quoted by shellers. The assumed prices for in-shell pecans are within the range of average prices, slightly lower than the 1960 prices, but well above the low prices paid for the 1961 crop. Since most of the charges are constants, similar selling prices can be computed readily for any given grower price and shellout percentage.

The accumulator margin is assumed to be the gross average difference between prices shellers paid to growers and prices paid to accumulators. In the Southeast this averaged 3.4 cents and in the Southwest 1.9 cents per pound. Most shellers reported they charged 2 cents per pound above their purchase price on sales of in-shell pecans to other shellers or processors. Reported shelling and overhead costs averaged 17 cents for shellers in all areas, while storage, interest, and handling charges averaged 3.4 cents. Since most pecans are shipped by truck to the major markets, and rates vary widely, the truck rates from Atlanta, Ga., and San Antonio, Texas, to New York City were used. The brokerage fee of 2 percent of the sales price is standard throughout the industry and averaged 2.5 cents per pound of medium size pecan halves in 1960-61.

The computations of margins are for illustrative purposes only. The marketing charges are averages for the 1960-61 season. Two major points are emphasized, however. First, the assembly cost for pecans is great. An increase of 1 cent in the procurement cost of in-shell pecans increases the kernel cost by approximately 3 cents, depending on the shellout percentage of the nuts. Secondly, the quality of the nuts a sheller purchases (as measured by the shellout percentage) is important in determining his selling price. For example, if the sheller pays 30 cents per pound for in-shell pecans, his kernel cost is 85.7 cents if the shellout is 35 percent, but only 75 cents if the shellout is 40 percent.

CONCLUSIONS

At the grower level, the competitive situation in the pecan industry closely resembles the model of pure competition propounded by the classical economists. At the sheller level, the models of oligopoly and monopolistic competition are approached. (1)

Throughout the gamut of market organizations, changes are taking place which affect the competitive relationships within the industry. Within the last 4 years, two of the larger pecan shelling firms have been purchased by large, multiproduct food corporations. Within the last 10 years, cooperatives and grower-sheller firms have became important factors in the marketing of shelled pecans. These changes within the industry also will affect the competitive position of the pecan industry with other tree-nut industries.

To compete effectively with other tree nuts, both domestic and imported, the pecan industry needs solutions to several production and marketing problems. On the production side, perhaps the greatest problem is the biennial production habit of pecan trees. The wide fluctuations in total production from year to year create hardships on pecan growers and serious marketing problems for shellers. Additional research is needed to find new varieties of trees and better cultural practices to minimize the wide fluctuations in pecan production.

On the marketing side, one of the major problems of the pecan shelling industry is the procurement of in-shell pecans. The wide areas over which pecans are produced and the large number of pecan growers who market small lots individually result in high procurement costs for shellers. These costs are reflected in higher prices for pecan kernels in the terminal markets. Additional research is needed to find ways to increase the efficiency of the farmers' marketing or of shellers' procurement practices.

Second, the pecan shelling industry needs to adopt wider use of grades in both procurement and selling. The farmer who grows high-quality pecans should be rewarded for his expense and efforts by higher prices for his pecans. Shellers can shell high-quality pecans more cheaply than poor-quality ones; high-quality kernels should bring a higher price in the terminal markets. But here, too, pecan shellers need to adopt more uniform standards for the various sizes and grades of pecan kernels.

Third, the pecan industry needs more information concerning the marketing of shelled pecans in commercial and retail outlets. Shellers need to know the preferences of consumers for the various forms in which pecans are marketed. They also need more information concerning how the use of pecans by commercial users and consumers can be increased.

Finally, the pecan industry needs more accurate information concerning the production of pecans from year to year and the trends in production for the years ahead. It also needs, in association with annual production data, information concerning carry-over of pecans from one year to the next. Efficient pricing of the pecan crop each year requires adequate knowledge of the supplies of pecans available.

Through studies of growers, nurseries, and commercial users of pecans, a better insight into many of these problems will be obtained. Research to improve crop forecasting procedures is also underway. There are other problems, however, that can be solved only by people in the pecan industry. The dissemination of knowledge concerning the pecan industry should assist in the solution of many intra-industry problems.

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